e. System Capacity

Licensees can construct their systems with sufficient capacity to utilize the entire GSTS frequency band.

f. International Coordination

Applicants must agree to international coordination and obtain any necessary approvals from other countries.

g. Carriage Requirements

Common carrier regulation of GSTS services would not be appropriate because the portable and mobile communications market, both in the United States and overseas, is characterized by a great deal of competition and relatively liberal market entry, especially via satellite.

2. Financial Qualifications

While the liberal technical rules will make possible a broad range of proposals, the financial qualification requirements -- along with the 80% coverage requirement, technical certifications, and implementation milestones -- will distinguish serious GSTS applicants and licensees from speculators.[20/] These measures are critical to the Commission's providing a pro rata share of spectrum to all qualified applicants. They not only will ensure that qualified applicants have sufficient spectrum to offer competitive service, but will prevent the squandering of this limited resource. Turning to the specific financial qualification requirements, the Commission should require GSTS

[20/] The Commission also should adopt legal requirements consistent with those used in other FCC services.

applicants to demonstrate their financial ability to construct, deploy and operate one stratospheric platform for one year.

3. Implementation Milestones

To ensure that GSTS licensees actually use the spectrum, the Commission also should establish implementation milestones. These milestones should be imposed as conditions on GSTS authorizations. As part of these milestones, each GSTS licensee should be required to deploy its first stratosphere platform within 24 months of its license grant.

Additionally, within ten days of each milestone requirement, each GSTS licensee should be required to submit a certified notice to the Commission indicating whether it has complied with its implementation schedule. Additionally, each GSTS licensee should be required to file an annual report with the Commission disclosing the status of its construction and system loading and any system malfunctions and outages.

In the event a GSTS licensee fails to meet its milestones, its authorization should be terminated. This spectrum would then revert back to the Commission for future licensing to other GSTS incumbents and/or new applicants.

4. Licensing Proposal

By adopting the other three policy principles, the Commission should be able to craft a licensing plan that allocates spectrum evenly among all qualified GSTS applicants and avoids the problem of selecting among mutually-exclusive international

service proposals.[21] The spectrum designation proposed above will free up 300 MHz + 300 MHz of spectrum for GSTS use. Based on the experience of the Ka-band systems, as many as 10 qualified applicants may apply for GSTS spectrum. Even assuming that three times as many applied, each would still be able to utilize 10+10 MHz. This is about the same amount of bandwidth provided to Big LEO licensees.

This pro rata licensing approach is consistent with the statutory directive to "use engineering solutions, negotiations, threshold qualifications, service regulations, and other means to avoid mutual exclusivity in application and licensing proceedings."[22] Congress issued this directive to confine the Commission's competitive bidding authority only to those situations where mutual exclusivity could not be avoided. The pro rata approach also would avoid preemptive and speculative bidding, the abuses and obstacles of nation-by-nation sequential bidding, and the difficult question of how to implement auctions in a global environment. These concerns, which that are not present in the domestic setting, could preclude the commencement of desirable international services.

SSI realizes that GSTS licensees will need a minimum amount of 10 + 10 MHz spectrum in order to develop a technically and economically viable system. But these limits simply will not be reached because the remarkable re-use capabilities of GSTS makes this service, for all practical purposes, not subject to mutually-exclusive applications.

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[21] The pro rata licensing approach does not restrict the construction of systems with the potential to use all GSTS frequencies.

[22] 47 U.S.C. § 309 (j)(6)(E).

a. Application Filing Procedures

Turning to the licensing procedures, the Commission should accept GSTS applications only during a specified filing window. The opening of the filing window would be announced by public notice some appropriate time in advance. The Commission should not accept major amendments to applications after the filing window closes. The Commission would then review the applications to determine whether they are acceptable for filing. All acceptable applications would be placed on public notice, triggering a 30 day petition to deny period. Any application not subject to a petition could be granted at the end of this period, subject to obtaining any necessary international frequency coordination and/or authorization.[23/]

b. License Term

The Commission should issue a blanket ten year license for the construction, deployment and operation of all stratospheric platforms in the global system, including the deployment of spares and replacements. The license term will begin when the first stratospheric platform commences service. The Commission also should adopt procedures for renewing GSTS authorizations.

[23/] In the event petitions to deny are filed, the Commission would still plan to distribute the spectrum on a pro rata basis to all applicants who had been accepted for filing. If one of the applications is ultimately dismissed or denied, this portion of the spectrum would stay with the Commission. The Commission would then have the option of accepting new applications.

c. Spectrum Aggregation Limits

Because of the high number of competitors already in the wireless marketplace, SSI takes no position at the present time on GSTS spectrum aggregation or cross-ownership restrictions.

d. Assignments, Transfer of Controls, Unjust Enrichment

The Commission should preclude the assignment or transfer of control of GSTS licenses without prior Commission approval. To prevent unjust enrichment, it also should prohibit the for-profit sale of 1) a bare GSTS license, or 2) the authorization of a licensee that is on the verge of failing to meet its implementation milestones.

CONCLUSION

In this era of technological breakthroughs, conventional ground rules cannot be permitted to stymie innovation. Here, the Commission has the opportunity to create a revolutionary new global wireless telecommunications service by simply building on its efforts in the Millimeter Wave Proceeding and making some fairly modest regulatory adaptations. For these reasons, SSI urges the Commission to establish GSTS rules as soon as possible and enable SSI and other qualified applicants to offer these new services to the public.

Respectfully Submitted,

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THE GLOBAL MARKET FOR GSTS

SSI expects that the GSTS will offer consumers worldwide wireless telecommunications service at lower prices than satellite cellular systems and with built-in digital video capability for personal videophone or portable Internet services that is not available through other systems. The GSTS will leapfrog the technical capabilities of cellular and mobile satellite services.

The two fastest growing telecommunications services are personal/mobile communications and Internet/World Wide Web access. The personal/mobile communications market has grown to 50 million subscribers in 1995 from its inception in 1986, and is reliably forecast to reach 100-150 million subscribers by the year 2000. The Internet/Web access market has similarly grown to 40 million subscribers in 1995 from its inception in 1991. This market is also forecast to have 100-150 million regular users by the year 2000. No other service is able simultaneously to provide service to both the personal/mobile and the Internet/World Wide Web market at only ten cents a minute. The GSTS has been designed with the capacity to serve up to one and one-half billion people.

A. Overview

1. Broadband Mobile Services and Wireless Internet Connectivity. The principal GSTS market will be that portion of the mobile communications market that wants broadband rather than narrowband mobile communications service. The benefits of broadband service include images of the information being discussed or of the people with whom one is communicating. The explosive growth of the wireless industry has demonstrated the tremendous demand Americans have for mobile communications

service. Long-term forecasts indicate that as many as half of all wireline telecommunications users will eventually become wireless telecommunications subscribers. Another benefit would be seamless interconnectivity with the Internet's image-rich World Wide Web, with the number of Internet users in excess of 40 million and estimated to be adding 750,000 users per month. Since these persons are as mobile as anyone else, this statistic indicates a huge amount of latent demand for wireless Internet connectivity.

2. Low-Cost Coverage. A second GSTS market will be that portion of the mobile communications market that wants supra-urban cellular coverage, but is unwilling or unable to pay the $1.00 per minute and higher rates charged by LEO MSS systems. The GSTS would provide continuous roaming capability throughout the United States and overseas at a rate of ten cents per minute, and without the necessity for long-distance phone charges if the other communicator is also a GSTS user. The Big LEO applicants are forecasting from one to ten million users each, based on their supra-urban coverage capabilities.

3. Developing Country Coverage. A third GSTS market consists of basic telephone service in parts of the world that are not covered by cellular or landline services and that cannot afford LEO MSS systems. With approximately 500 million phone lines in place worldwide, but over 5 billion people on the planet, it is clear that there is room for vast growth in basic telephone service to the rest of the world. The GSTS will provide the developing world with an instant nationwide broadband telephone

service without the need to construct prohibitively expensive terrestrial or satellite systems.

4. Size of the Market: Cellular Comparison. Overall, SSI believes that the GSTS market demand is best calculated by reference to worldwide cellular phone usage. Most estimates place cellular phone use at 50 million subscribers today, 100-150 million by the year 2000, and 200-300 million by the year 2005. The GSTS is certain to appeal to a significant percentage of this market with its greater bandwidth, wider coverage and lower price. In terms of the size of the GSTS marketplace, SSI believes the GSTS will support 1.5 billion subscriber channels. This is adequate capacity to serve the world-wide market for broadband portable telecommunications service.

B. Market Analysis

GSTS services will be in demand by both high-end mobile communications users in developed countries as well as by initial users of telecommunications services in the developing world. The market focus of the GSTS will nevertheless be kept clear: broadband portable telephony, that includes portable picturephone service and wireless Internet/World Wide Web connectivity.

1. Rapid Growth in Personal and Mobile Communications Services

Although today about half of the world's 50 million cellular phone subscribers are in the United States, the Department of Commerce forecasts that most of the growth in cellular subscribers after the year 2000 will occur outside of the United States. At present, more than 3 billion people in Asia have only 75 million telephone lines and, in Africa, with 500 million people, there is only one telephone per 1000

people. The cost of closing the telecommunications gap in developing countries has been estimated to be $3 trillion. GSTS offers a much faster and less costly way to bring telephone services to the majority of the world's peoples.

a. *United States*. In the United States personal communications services have developed at a rapid rate. Most major metropolitan areas will soon have three, four or more competitive providers of cellular and other personal communication services. Consequently, service charges are expected to drop, and combined telephone, paging and other narrowband services are expected to be aggressively marketed.

SSI expects the GSTS to leapfrog existing services in the U.S. marketplace in certain respects by offering broadband personal communications service with video and Internet/World Wide Web access capabilities priced lower than contemplated higher capability satellite services and competitively with the current capability offerings of cellular and PCS systems. In particular, GSTS will offer lower cost portable picturephone service without the jumpy video quality that traditionally plagued this service. SSI will also offer portable high speed 64 kbps access to the Internet's World Wide Web at costs far lower than promised by the next generation of Ka-Band satellites systems that have not yet been implemented. This will free users from the need to always find a phone jack connected to a high speed modem in order to "surf the net."

GSTS communicators will be inexpensive because the hardware price will be largely paid for by service providers (communications and/or Internet access) eager to have a recurring revenue stream. The picturephone capability of the GSTS communicators will likely be popular, especially because their very low prices will enable

many people to videophone their friends. And, the jumpy images of older picturephones is no longer an issue with the ITU-T H.263 audio-video data compression standard.

b. *Other Developed Countries*. The GSTS will likely be even more desirable in developed countries other than the United States. The ability to have high speed low-cost access to the Internet's World Wide Web is likely to be especially attractive overseas where local Internet access charges are far more expensive than in the United States. The GSTS also may grow rapidly overseas because of its much greater cost-effectiveness for long-distance communications within Europe. With the GSTS, calls between countries will cost the same ten cents per minute that intra-city calls cost. Today, calls between countries within the European community begin at approximately one dollar per minute.

Most developed countries will receive the GSTS during 2000-2002, promptly after the receipt of final regulatory approval by the ITU at the 1997 or 1999 World Radio Conference. SSI's vendors will have already set up a stratospheric station production line for satisfying the United States market, and it is anticipated that this production line can continue without interruption to fill out service worldwide.

c. *Developing Countries*. In developing countries, SSI believes there are two distinct GSTS markets. The first market is for those persons who already make use of cellular phones, but are frustrated by busy signals or lack of coverage outside of major cities. They will become early users of the GSTS. The second market is for those persons who have no ready access to modern telecommunications due to either economic or infrastructure reasons. For these persons, a solar-powered fixed-site village GSTS

communicator is the only feasible way to join the telecommunications revolution. Many people in rural areas have relatives overseas in the United States or Europe. With the GSTS communicator and a phone payment card, the population in rural areas will be able to both hear and see their relatives abroad.

In addition, SSI foresees gifting GSTS access and equipment to educational, public health and environmental organizations in the developing world. These gifts will enable millions of people to enhance the quality of their life, while also opening the relevant national markets to the GSTS.

2. LEO MSS Projections

Some low earth orbit mobile satellite service (LEO MSS) companies project that they will capture the 1-2% of the cellular market that is willing to pay as much as $1-$3 per minute for airtime in order to have service that is more available than terrestrial cellular, is less likely to drop calls, and works literally everywhere in the world. GSTS will offer even better reliability than LEO MSS due to higher elevation angles. On the other hand, GSTS will serve populated regions of the earth, at least in initial implementation. Hence, an individual working in a remote area, such as the Sahara Desert or the Arctic Circle, would be better served with a LEO MSS phone than a GSTS communicator.

Based on Commission filings, LEO MSS firms expect to have the following number of subscribers by 2005:

Iridium	5.1 million
GlobalStar	10 million
Odyssey	4.8 million
ICO	4.6 million

By comparison, SSI projects it will have 18 million GSTS subscribers by 2005, at a cost of ten cents per minute compared with the $1-$3 per call cost for LEO MSS.

C. Demand and Penetration

SSI estimates the demand and penetration for its GSTS services as a percentage of demand for cellular telephone services. This may understate demand because SSI's GSTS system will capture market segments that would not otherwise purchase cellular phones -- those for whom cellular fees are too high or cellular coverage is inadequate. In addition, GSTS will attract those whose demand for wireless Internet/World Wide Web service cannot be met by cellular systems because of bandwidth limitations.

1. Relevant Data. The Internet/on-line market is sized separately from the cellular market because SSI believes that separate penetration assumptions are needed for these two main thrusts of its business plan.

a. Cellular *(Millions of Subscribers, Region of Magnitude (ROM))*

	YEAR					
Market	2000	2001	2002	2003	2004	2005
N. Amer.	30	35	40	45	50	55
Europe	30	35	40	45	50	55
Asia	30	35	40	45	50	55
S. Amer.	10	15	20	25	30	35
Africa/ME	-	3	5	10	15	2025
Total	103	125	150	175	200	225

Source: FCC and ITU Filings; SSI Analysis

b. Internet/On-Line *(Millions of Regular Users, Region of Magnitude (ROM))*

	YEAR					
Market	2000	2001	2002	2003	2004	2005
N. Amer.	45	50	55	60	65	70
Europe	20	25	30	35	40	45
Asia	25	35	40	45	50	55
S. Amer.	8	12	20	25	30	35
Africa/ME	-	2	3	5	10	1520
Total	100	125	150	175	200	225

Source: Global Telecoms Business Oct./Nov. 1995; SSI Analysis

2. Penetration Forecast. SSI believes that a greater percentage of cellular and Internet/World Wide Web users will subscribe to its GSTS system in the developing world than in North America and Europe. The reason for this is the relatively greater lack of roaming cellular service and Internet access capability in the developing world. SSI's current cellular penetration forecast, net of churn, is as follows:

Percentage of Cellular Subscriber Forecast Likely to Use Stratospheric Station

Market	2000	2001	2002	2003	2004
N. Amer.	1%	2%	3%	4%	5%
Europe	1%	2%	3%	4%	5%
Asia	2%	4%	6%	8%	10%
S. Amer.	2%	4%	6%	8%	10%
Africa/ME	5%	10%	15%	20%	25%

Source: SSI Analysis

D. Competitive Advantages of GSTS

Given its unique and significant service and market profile, once GSTS is implemented, it will offer true inter-modal competition to existing and proposed satellite and terrestrial systems. At present, mobile and personal communications systems offer only voice and data communications service.[1/]

[1/] Although there is a proceeding before the Commission to authorize a higher speed wireless networking service for laptop computers in the 5 GHz band, this service, when implemented, will use land-based transponders and hence cannot provide the wide area coverage of the stratospheric telecommunications service. See Allocation of Spectrum

(continued...)

1. Cellular. The maximum speed cellular modem available is 2.4 kbps, a speed at which use of the Internet/World Wide Web is not very interesting and any form of video telephony is all but impossible. Cellular communications systems are not currently designed for wireless videophone or Internet Web browsing.

2. PCS. PCS may provide a wideband alternative to cellular phone service. GSTS would compete with these services, but GSTS would be able to work virtually anywhere a consumer or businessperson went.

3. Future Services. Future competitive offerings could be made by the LEO MSS and Ka-band satellite services in both low and geostationary orbit. Four companies are in the process of building worldwide wireless mobile and personal communications systems: Iridium, GlobalStar, Odyssey, and ICO. Collectively these systems have already raised about $4 billion of equity capital in the past 24 months to implement services that are less comprehensive, and more expensive than GSTS. These services -- basically global mobile voice and paging -- will start to be implemented during 1997-1999.

Ten companies have asked the Commission for approval to build global Internet/World Wide Web transmission systems in the Ka-band (20-30 GHz), following an $8 billion lead proposal from Teledesic. None of these systems would have the portable capability of SSI's GSTS, nor its very low service price.

[1/](...continued)
Below 5 GHz Transferred from Federal Government Use, Second Report and Order, 60 Fed. Reg. 40712 (Aug. 9, 1995).

E. The Proposed GSTS can Meet this Unmet Demand Quickly and Efficiently.

1. The Stratospheric Stations Will be Constructed and Deployed at Low Cost.

Although each GSTS applicant will design and construct its own GSTS system, SSI has prepared a construction and deployment plan that will quickly meet the requirements of the new service. SSI's team has carefully priced the cost of the first 650-foot prototype platform, including its millimeter wave band communications payload at $35 million, and a recurring price for the remaining 250 platforms at $15 million each, somewhat more or less, depending on size.

Prices in this range compare favorably with those for other large scale aerospace communications production lines, including Iridium, GlobalStar and Teledesic. For example, Teledesic estimates that its $8 billion 840800 LEO satellite system can be constructed at a cost of $10 million per satellite including launch. Although GSTS is conservatively forecast to cost about $15 million per platform, the cost for near global coverage is expected to be only $4.2 billion.

2. The GSTS will Operate with Low-Cost Mobile Communicator Devices.

As with cellular and PCS telephones, mass production and the underwriting of hardware costs by service fees will enable manufacturers to provide GSTS communicators at very low cost to the public. The inception of service and the demand for millions of units enabled manufactures to mass produce chipsets for devices utilizing the 900 MHz band (cellular), the 2GHz band (DBS), and the 2 GHz band (PCS) at affordable prices. The same will be true for GSTS communicators.

U.S. TELECOMMUNICATIONS LEADERSHIP AND ECONOMIC GROWTH

It is vital to maintain the United States' lead in the development and operation of advanced telecommunications systems. The United States is a world leader in both aerospace and millimeter wave electronic technologies. The GSTS fuses these two areas of technical and market leadership, creating a new multi-billion dollar market for stratospheric platforms, millimeter wave chipsets and global broadband wireless services. In just the first five years following regulatory approval, and for just a single GSTS licensee, SSI estimates the dollar impact on the United States economy to be:

250 Stratospheric Platforms	$ 3 billion
18 Million Millimeter Chipsets	$ 2 billion
18 Million Service Subscribers	$ 15 billion
Total New Revenues	$ 20 billion

At an average value of $100,000 revenue per employee, GSTS approval by the Commission will generate upwards of 200,000 new job-years of employment jobs based on several conservative assumptions. The long-term impact for U.S. GSTS leadership almost certainly totals over a million new jobs and many tens of billions of dollars in export earnings.

And since other countries, including Japan, are actively developing similar stratospheric telecommunications platform technologies, it is also critical for the Commission to establish the GSTS in the new frontier of the high 40 GHz range in order to maintain United States technology leadership for the benefit of American jobs and economy. If the United States is the first nation to deploy the GSTS, it will be

well-positioned to take the lead in the provision of GSTS worldwide. By conquering the high Gigahertz frontier, the United States will be at the forefront, just as it has with the cultivation of ever-higher frequency bands with cellular service at 910 MHz, PCS at 2 GHz and the Licensed Millimeter Wave Service above 40 GHz.

The United States has been the first nation to cultivate new frequency frontiers, developing the competitive know-how to lead the industry, generate American jobs and stimulate the nation's economy. Although we believe that SSI, an American company, presently leads the rest of the world in development of the technology needed to construct, deploy and operate a GSTS network, it is not clear that this current U.S. advantage will continue beyond the next few years. If the GSTS regulatory approval process is delayed, it is likely that other countries will deploy and operate GSTS systems before implementation in the United States. Foreign dominance of the GSTS marketplace would hurt the United States economy and its telecommunications competitiveness. GSTS platform technologies are actively being developed in Japan and SSI's application to construct, deploy and operate a GSTS will become public knowledge and could be copied and implemented by other nations if the GSTS is delayed by the United States regulatory process.

In addition to promptly acting on this pleading and SSI's concurrent application, the Commission can help secure global availability of GSTS service by seeking to ensure that GSTS service can use its desired frequencies under international frequency allocation guidelines. Accordingly, SSI urges the Commission to seek the minor changes to the international table of frequency allocations discussed below at the

1997 and 1999 World Radio Conferences in order to permit global operation of the GSTS.

INTERNATIONAL AND DOMESTIC ALLOCATION CONSISTENCY

a. **International Allocation Consistency**

Footnote 901 of the international table of allocations currently provides:

> "The allocation of the spectrum for the fixed-satellite service in the bands 42.5-43.5 GHz and 47.2-50.2 GHz for Earth-to-space transmission is greater than that in the band 37.5-39.5 GHz for Space-to-earth transmission in order to accommodate feeder links to broadcasting satellites. Administrations are urged to take all practical steps to reserve the band 47.2-49.2 GHz for feeder links for the broadcasting satellite service operating in the band 40.5-42.5 GHz. *ITU Radio Regulations, Article 8, Footnote 901*

The Commission should request to adjust the wording of footnote 901 at the upcoming WRC-97 Conference to read as follows:

> "Use of the bands 47.2-47.5 GHz (Earth-to-Stratosphere) and 47.9-48.2 GHz (Stratosphere-to-Earth) by the fixed service and by the mobile service is limited to global stratospheric telecommunications service. Stations in the fixed-satellite service may be operated subject to not causing harmful interference to the global stratospheric telecommunications service. The allocation of the spectrum for the fixed-satellite service in the bands 42.5-43.5 GHz and 47.2-50.2 GHz for Earth-to-space transmission is greater than that in the band 37.5-39.5 GHz for Space-to-earth transmission in order to accommodate feeder links to broadcasting satellites. Administrations are urged to take all practical steps to reserve the band 47.2-49.2 GHz for feeder links for the broadcasting satellite service operating in the band 40.5-42.5 GHz Administrations are urged to take all practical steps to reserve the band 47.5-47.9 GHz and 48.2-49.2 GHz for feeder links for the broadcasting satellite service." *Proposed WRC-97 Revision to ITU Radio Regulations, Article 8, Footnote 901.*

Or, in its redlined form, as follows:

> "<u>Use of the bands 47.2-47.5 GHz (Earth-to-Stratosphere) and 47.9-48.2 GHz (Stratosphere-to-Earth) by the fixed service and by the mobile service is limited to global stratospheric telecommunications service. Stations in the fixed-satellite</u>

> service may be operated subject to not causing harmful interference to the global stratospheric telecommunications service. The allocation of the spectrum for the fixed-satellite service in the bands 42.5-43.5 GHz and 47.2-50.2 GHz for Earth-to-space transmission is greater than that in the band 37.5-39.5 GHz for Space-to-earth transmission in order to accommodate feeder links to broadcasting satellites. Administrations are urged to take all practical steps to reserve the band 47.2-49.2 GHz for feeder links for the broadcasting satellite service operating in the band 40.5-42.5 GHz Administrations are urged to take all practical steps to reserve the band 47.5-47.9 GHz and 48.2-49.2 GHz for feeder links for the broadcasting satellite service." *Proposed WRC-97 Revision to ITU Radio Regulations, Article 8, Footnote 901.*

It also will be necessary to add official ITU definitions for Global Stratospheric Telecommunications Service and for Stratospheric Station. SSI suggests that the following definitions will be useful and are consistent with the ITU's regulatory framework:

> Global Stratospheric Telecommunications Service: A *radiocommunications service* between *stratospheric stations* and any combination of *mobile stations* and *fixed stations*, with such service intended for capability of operation beyond the geographical limits of a country or continent.
>
> Stratospheric Station: A *station* located at a fixed position in the stratosphere.

In the event that a definition for stratosphere is also needed, the following practice-oriented one may be employed:

> Stratosphere: The region between airspace and outerspace, approximately 20-80 kilometers above the earth's surface.